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ABSTRACT

In a previous Semantic Differential study, Ayrer and Farber (1972) reported the results of a factor analysis which utilized a matrix sampling approach. Some problems were encountered (negative eigen-values). The current study did not involve matrix sampling, but the same basic results were obtained. This suggests matrix sampling may be an efficient, reliable, and valid method of building a matrix for factor analysis. The structure of the semantic space is virtually the same as previously found (although the SES of the respondents differed), but is quite different from the classical EPA of Osgood and the findings of Di Vesta (1966). (Author)

THE SEMANTIC STRUCTURE OF A SET OF SCALES DEVELOPED FOR USE WITH LARGE CITY PUPILS - A FOLLOW-UP STUDY

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INTRODUCTION

The purpose of the development of the Semantic Differential was to obtain a quantitative index of meaning (Osgood, Suci, and Tannenbaum, 1957). Since the technique used verbal encoding, it was necessary to develop "a carefully devised sample of alternative verbal responses which can be standardized across subjects... (and which will be) representative of the major ways in which meanings vary" (Osgood, Suci, and Tannenbaum, 1957, p.19). As Osgood, et al pointed out in the same volume, the sample of subjects on the basis of which the scales were devised was inadequate, since the subjects were mostly college undergraduates.

It has been contended (McNamara, Ayrer, and Farber, 1972) that scales developed on such a population might lead to an increase in error variance if used with elementary school children, since the scales used would not be typical of their language patterns. They would be expected to rate a set of concepts using scales consisting of adjectives which they would not normally use. Such a concern has also been voiced by Di Vesta (1965).

It was for this reason that it was decided to develop a set of scales based upon the language patterns of elementary school children such as those that are found in the Philadelphia schools. In a paper presented at the 1972 AERA Conference, Ayrer and Farber (1972) presented the results of a factor analysis based upon the semantic differential responses of 557 sixth grade Philadelphia public school children who were primarily (about 75%) of lower socioeconomic status.

There were a number of interesting findings. To begin with, in most of the factor analyses of semantic differential responses which the authors have seen, the first three factors extracted were Evaluation (E), Potency (P), and

Activity (A). In this study, the Evaluative dimension seemed to have split into two: the first involving characteristics of others, and the second involving feelings related to self. Factor 3 seemed to be a combination of Activity and Potency, sometimes referred to as Dynamism (Di Vesta, 1966). Factor 4 was also Evaluative but seemed to involve a concern for personal safety. Scales loading on Factor 5 had been found to load on all three dimensions in studies by other investigators. It appeared to be a "spill-over" factor.

The three major dimensions usually account for about forty to fifty percent of the total variance. In this study, the first three factors accounted for twenty-five percent of the total variance and it was necessary to go to seven factors to get over forty percent of the total variance. The only similar findings known to the authors are by Evans (1971) using junior and senior high school students. He had to go to ten factors to get forty percent of total variance. His first factor accounted for eighteen percent of total variance, while none of the others accounted for more than four percent.

Finally, twenty-eight of the forty-three scales with loadings greater than .40 were previously unfactored scales from the McNamara-Ayrer-Farber study, also presented last year. Thus, a series of new scales had been developed with known factorial composition which are more appropriate for elementary school children.

The current study was designed as a follow-up to last year's study. Since the 1972 data were based upon responses of primarily lower socio-economic status students, it was considered important to determine whether the same factor structure would be obtained if middle socioeconomic status students were used.

METHOD

Scales

The same seventy-two scales used in the previous study were used here. These scales were developed exclusively from adjectives provided by city school subjects in grades 4, 6, 7, and 8. Each scale was randomly assigned to a scale package (a set of nine scales). The scales are listed in Table 1.

Insert Table 1 here

Concepts

One of the problems in factor analytic work with the Semantic Differential is the need for a wide variety of concepts if the factor analysis is to determine the basic dimensions along which meaning varies. If only one type of concept is used, it might restrict the number of dimensions that would appear. In this study, 112 concepts were used. They were selected to be representative of the pupils' total life space. They are shown in Table 2 along with the scale packages assigned to them.

Insert Table 2 here

Administration

Since there were 72 scales and 112 concepts, this would have required each subject to make more than 8,000 responses. Clearly, it would have been unrealistic to expect sixth graders to maintain motivation and attention for

such a task. To overcome this difficulty, a form of matrix sampling was used.

The response sheet used in this study had spaces for four concepts on a page, with nine scales per concept. It was decided that a reasonable task for sixth graders would be to have them rate sixteen concepts. Since there were eight scale packages, this made it possible to use each package twice. The scale packages had been ~~randomly assigned to concepts, and~~ the concepts were now randomly assigned to pages. The pages were then collated into four-page booklets, the only requirement being that each child use all eight scale packages. (Actually, ratings are summed across concepts in work of this nature, so the concepts rated are not of great importance provided they span semantic space.)

A five-point semantic differential was used. Standard Osgood directions were used and modified for the sixth graders. The examiners were the authors.

Subjects

The subjects were 210 sixth graders from Philadelphia public schools. They were almost exclusively middle class students.

Analysis

Mean scores were computed for each scale for each subject. These scores were then submitted to BMD03D, a Biomed correlation program (Dixon, 1964). The resulting 72x72 matrix was factor analyzed using the Principal Components technique (BMD03M with unity in the diagonal [Dixon, 1964]). The Varimax criterion was used in rotation. To make the results comparable to the 1972 study, five factors were extracted and rotated.

RESULTS

The results of the analysis are shown in Table 3. They are quite similar to the previous study.

Insert Table 3 here

There does not seem to be a Potency or an Activity factor. All five factors seem to be Evaluative in nature. Factor 1 did not appear in last year's study but factors 2, 3, and 4, did. Moreover, factors 2, 3, and 4, were all defined by the same scales with approximately the same rank order in loading. In addition, each of the five factors account for virtually the same amount of variance and same percent of total variance (33%) as last year.

DISCUSSION

The main purpose of this research was to compare the factor structure of a set of 72 scales used by middle socioeconomic (SES) pupils with that obtained from the same 72 scales when used by lower SES pupils.

The two factor structures were substantially the same. As mentioned previously, three of the factors were not only defined by the same scales, but the loadings were quite similar. The current Factor 1 did not appear in the previous study. Factors 2, 3, and 4, did. Factor 2 seemed to measure feelings related to the self (Factor 1 of the lower SES study) while Factor 3 seemed to measure characteristics of others (Factor 2 of the lower SES study). Factor 4 seemed to measure a dimension which we named Personal Safety.

Factors 1 and 5 seemed to measure ideal personality types. The first factor was defined by scales whose positive end was Handsome, Colorful, Interesting, Happy, and Fast. It looked like an Ideal Male Factor. The fifth factor was defined by Loving, Nice, Kind, Soft, Smooth, and Nice. It looked like an Ideal Female Factor. We called them the Rock Hudson and Doris Day factors, respectively.

The interesting thing about these results is that all five factors seem to be Evaluative in nature. In most previous studies, a Potency and Activity factor also appeared. (In some cases, they merged. This was also the case in our previous study. In such cases, the dimension is known as Dynamism [Di Vesta, 1966].) Of course, those studies used primarily college students and middle class ones at that. Now, using sixth grade public school students, only Evaluative factors appear. Given the consistency between the two studies, it seems reasonable to suggest that such students use the language differently. It does not seem inconsistent with what we know from Adolescent Psychology. The child of this age is in the process of building a self-concept out of the criteria of others. Peers and parents are telling him what is good, interesting, beautiful, brave, kind, smart, etc. It seems reasonable that the way he feels about things will be determined by these outside forces.

To the child in the inner-city schools, the concern for Personal Safety is a very real one, and it does not seem unreasonable to find this a major dimension along which meaning varies.

It should be pointed out that the opportunity for Potency and Activity to appear existed. Ten of the scales used had been used by Osgood in the 1957 study and had had high loadings on Potency and Activity.

When used here, however, they either did not load on any of the factors or they seemed to take on an Evaluative hue.

The similarity of the current findings to last year's study may be considered a corroboration of both. Specifically, a set of scales of known factorial structure has been identified which is appropriate for use with large city school pupils. In addition, support has been given to the proposition that the dimensionality of the semantic space of large city school pupils is different from that of college students. Further investigation in this area seems worthwhile.

Further studies are now being planned both to replicate the present studies with additional samples of comparable populations, and to expand the present study to include other grade levels.

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TABLE 1

List of Seventy-two Scales Used in the Study

Weak-Strong*
Cold-Hot*
Good-Bad*
Fast-Slow*
Soft-Hard*
Long-Short*
Dull-Sharp*
Rough-Smooth*
Sweet-Sour*
Black-White..(O)
Beautiful-Ugly..(O)
Red-Blue..(D)
Round-Square..(D)
Big-Little..(D)
Clean-Dirty..(O)
New-Old..(D)
Small-Large..(O)
Sad-Happy..(O)
Ugly-Pretty..(D)
Awful-Nice..(O)
Wide-Narrow..(O)
Young-Old..(O)

High-Low..(O)
Bright-Dark..(O)
Brave-Cowardly..(O)
Loud-Soft..(O)
Cold-Warm.
Fat-Skinny.
Strict-Nice.
Mean-Nice.
Easy-Hard.
Yellow-Green.
Blue-Green.
Male-Female.
Rough-Gentle.
Rough-Soft.
Boring-Exciting.
Dull-Exciting.
Uninteresting-Interesting.
Interesting-Dull.
Boring-Interesting.
Tall-Short.
Big-Small.
Intelligent-Dumb.

Smart-Dumb.
Smart-Stupid.
Kind-Mean.
Kind-Unkind.
Dull-Colorful.
Dull-Bright.
Loud-Quiet.
Awful-Wonderful.
Awful-Good.
Fat-Thin.
Angry-Happy.
Wide-Thin.
Unnecessary-Necessary.
Warm-Cool.
Comfortable-Uncomfortable.
Dangerous-Safe.
Healthy-Sick.
Healthy-Unhealthy.
Muscular-Weak.
Noisy-Quiet.
Loving-Hating.
Brave-Scared.
Huge-Tiny.
Huge-Small.
Ugly-Handsome.
Ugly-Cute.
Friendly-Unfriendly.

*Appears in Di Vesta's (1966) and Osgood's (1957) Lists.

.Appears only in this study.

..Appears in Di Vesta's or Osgood's Lists.
(Initials indicate which.)

TABLE 2

Concepts Used in This Study Arranged By Scale-Package

1	2	3	4	5	6	7	8
Parents	Adults	Smoking	Hot Dogs	School Work	Teenagers	Winter	My Friends
Peace	Medicine	My Community	Baseball Player	Bed	Cat	Brother	Shoes
Hairdresser	Our Flag	Spelling	Getting Suspended	Teacher	Dancing	Dog	Prison
Skates	Ice Cream	Thunder	Staying After School	Football Player	Snow	America	Farm
Class	Nurse	Man	Cowboy	Hair	Cake	Tree	My City
House	Party	School Yard	Mini-Skirts	Fish	Policeman	Liver	Boys
Bicycle	Truck	War	Drugs	Singer	Drug Store	Cherry Pie	Flowers
Summer	Candy	Children	Maxi-Skirts	Work	Dating	Girls	Philadelphia
Spinach	Newspaper	Grandmother	Recess	Basketball Player	Telephone	Apple	Principal
Report Card	Fire	Studying	Music	Desk	Cow	Money	Book
Sister	Noise	Army	Rain	Taxi	Classmates	Moon	Wet
Job	Games	River	Chair	Supermarket	Street	Homework	Reading
Me	Coat	Bread	Tests	Woman	Dancer	My Clothes	My School
Baby	Car	Television	Toys	School	Birthday	Auto Mechanic	Radio

TABLE 3

Results of Factor Analysis and Rotation

Scale Name	Loadings in First Study	Loadings in Previous Studies*	Loadings in This Study (Factor)				
			1	2	3	4	5
1. Ugly-Handsome	Factor 1	None	.6				
2. Colorful-Dull	<.40	None	-.62				
3. Uninteresting-Interesting	<.40	None	.60				
4. Happy-Sad	<.40	E	-.59				
5. Slow-Fast	<.40	A	.57				
6. Healthy-Sick	<.40	None	-.53				
7. Young-Old	Factor 5	E-P-A	.48				
8. Happy-Angry	Factor 2	None		.82			
9. Good-Bad	Factor 2	E		.82			
10. Comfortable-Uncomfortable	Factor 2	None		.79			
11. Dumb-Smart	Factor 2	None		-.75			
12. Bright-Dull	Factor 2	None		.75			
13. Sour-Sweet	Factor 2	E		-.59			
14. Weak-Muscular	Factor 2	None		-.57			
15. Cowardly-Brave	Factor 5	E-P		-.44			
16. Awful-Good	Factor 1	None			.84		
17. Interesting-Dull	Factor 1	None			-.82		
18. Ugly-Beautiful	Factor 1	E			.78		
19. Ugly-Cute	Factor 1	None			.73		
20. Bright-Dark	Factor 1	E			-.65		
21. Rough-Gentle	Factor 1	None			.49		
22. Unkind-Kind	Factor 4	None				.80	
23. Unhealthy-Healthy	Factor 4	None				-.79	
24. Safe-Dangerous	Factor 4	None				.79	
25. Clean-Dirty	Factor 4	E				.79	
26. Unfriendly-Friendly	Factor 4	None				.78	
27. Hating-Loving	<.40	None					-.60
28. Nice-Awful	<.40	E					.56
29. Mean-Kind	<.40	None					-.54
30. Soft-Hard	Factor 3	P					.52
31. Rough-Smooth	Factor 5	E-P-A					-.52
32. Mean-Nice	Factor 5	None					-.49
33. Soft-Rough	Factor 3	None					.46
34. Brave-Scared	<.40	None					.45
35. Noisy-Quiet	<.40	None					-.44
36. Smart-Stupid	<.40	None					.42
Eigenvalue			6.2	5.5	4.9	4.0	3.3
Percent of Total Variance			8.6	7.6	6.8	5.5	4.6

*The previous studies were by Osgood, Suci, and Tannenbaum (1957) and Di Vesta (1966).